indeed essential, to have at hand separate parts of skeletons, or individual bones, which may be kept in boxes, drawers, cases, or in any way found to be most convenient. Entire skeletons with the bones separated occupy very little space in boxes, and the most characteristic parts may be selected and mounted in the way I shall presently indicate.

Everyone in charge of a biological museum, however small, should be familiar with the mode of preparing skeletons. I can only indicate the outlines of the process, for in this, as in every other part of the work of making anatomical preparations, a few practical lessons from a person already an adept, and a little experience and observation will do more than any description. When the principles are known, the details can be carried out with such modifications and improvements for each individual case, as the skill and ingenuity of the operator can suggest. With regard to museum specimens generally, the question is frequently asked how such or such a preparation is made, and an answer is expected in a few words, which will enable the questioner to do the same himself. This is much as if a novice who had never handled a brush were to ask an artist how he had painted his picture and expect that a few simple directions would put him on a level with the master. Preparation-making is an art which can only be acquired by labour and perseverance, superadded to some natural qualifications not possessed in an equal degree by all.

To return to the bones, as in many respects the simplest kind of preparations. There is a popular notion that skeletons are made by putting animals into ant-hills. So I have been told over and over again ever since I was a child. I must, however, say that I have never actually seen, or even heard of a skeleton really made in this way, though ants, doubtless, especially in hot countries, will make short work of the flesh of an animal's body, leaving at least all the larger bones untouched. But we must adopt some safer and more universally applicable method of proceeding. Another common idea is that some "chemical" substance is necessary to steep them in for dissolving the soft parts, and I am often asked "What acid do you use for this purpose?" when a little reflection would have shown that the bones would be the first parts to disappear under the influence of such a menstruum. No—water—pure water, is the only thing required in preparing bones and skeletons in the great majority of cases, and in the proper use of the water the art of "macerating," as it is called, chiefly consists.

This process is nothing more or less than placing bones in water and leaving them undisturbed until putrefaction of all the flesh and blood remaining on and around them and within the hollows and small cavities of their interior, takes place, and these soft parts entirely lose their form and structure and become converted into liquids and gases mingled with the water or escaped from its surface; so that when the bones are removed and well washed, nothing remains but the comparatively indestructible true osseous tissue, which, when dried, is hard, clean, and without smell.

Maceration consists, then, essentially in the destruction of the soft tissues by putrefaction, and certain circumstances are essential or favourable to the success of the process. In the first place, the water should not be too abundant in proportion to the amount of animal matter to be destroyed. Then it should never be changed or disturbed until the process is completed. The surface should be exposed to the air, and the loss from evaporation supplied from time to time. The temperature should be uniform and elevated. Cold checks the process; freezing arrests it altogether. If the heat is too great the bones are often greasy and discoloured, as when they are prepared by boiling. It is to the fact that the process varies in rapidity according to so many circumstances that the chief practical difficulty, which is to know when it is completed, is due. If the bones are taken out too soon, unless they are returned immediately to the same water, a check takes place in their preparation. To estimate the necessary time is a matter acquired only by practice and knowledge of the surrounding circumstances. Much will depend upon the size of the bones, small bones macerating much more rapidly than large ones; also upon their condition, if fresh, they macerate far more quickly than if they have been previously dried (as is the case with skeletons sent from abroad in a rough state), or if they have been kept in spirit or any other preservative solution.

When the bones are to be removed, the water must be carefully poured off through a hair seive, and all the solid matter which remains at the bottom of the jar must be carefully searched from any of the smaller bones which might otherwise be lost. They are then removed to clean water, frequently changed for several days, well washed with a brush if necessary, and dried, if possible, in the sun.

The process of maceration is necessarily attended with disagreeable smells. As long as it continues the surface of the water slowly emits gases; but the worst is when the water is stirred up by pouring it off to remove the bones. Hence it should be carried on in the open air, or what is far better, in a building isolated for the purpose, and in which the temperature may be kept uniform. When maceration has to be conducted among dwellings, it is necessary to be very careful not to disturb the vessels, and to put some disinfectant, as chloride of lime, into them the day before the contents are taken out. This will obviate most of the usual disagreeable effects, and if not used in too great a quantity, will not cause any material damage to the bones. But chloride of lime, when used too freely, is a dangerous agent; it destroys the gelatinous portion of the osseous tissue (which of course is not removed in maceration) and leaves the bones white, chalky, and friable. After proper maceration no chemical bleaching is required. Exposure to sunlight or alternate sun and rain for some months is generally good, especially for large solid bones, though this may be carried too far, as the intensely white, cracked, porous and fragile condition of osseous fragments which have been lying long on moors or hill-sides, shows. Bones are not naturally of a pure white colour, but have a delicate yellowish or creamy tint like that of ivory.

Several substitutes for the process of maceration in water are occasionally adopted under special circumstances.

1. Boiling. This process has the advantage of rapidity, but is seldom resorted to except when absolutely necessary (as in the case of the celebrated skeleton of the "Irish giant" in the Hunterian Museum), as the fatty matter in the medullary cavity is melted and pervades the whole osseous tissue, and generally leaves the bones discoloured and greasy, as may be seen in most of those that have been cooked for the table.

2. Burying in the ground may be resorted to when there are no conveniences for maceration, but it is even a slower process. The effect upon the bones is the same, but they are nearly always stained brown by the colouring matter in the soil, and the small ones are apt to get lost.

3. It has lately occurred to me, following out a suggestion of Mr. Seymour Haden's in his excellent letters, entitled "Earth to Earth," relating to the best mode of disposing of the dead, to clean bones by burying them in a basket of charcoal, and though the experiments are not quite complete, they promise excellent results, especially as all the disagreeable odour of maceration is entirely obviated, and the process may even be carried on in inhabited rooms without any inconvenience.

(To be continued.)

OUR ASTRONOMICAL COLUMN

A NEW STAR IN CYGNUS.—On November 24, at 5h. 41m. P.M., the director of the Observatory at Athens, Prof. Schmidt, remarked a star of the third magnitude not far from ρ Cygni, which was not visible on November 20, the last clear evening previous. Its position from observations with the refractor was found to be in R.A. 21h. 36m. 50·5s., N.P.D. 47° 40′ 34″ for the beginning of the present year. At midnight its light was more intense than that of η Pegasi, which is rated a third magnitude by Argelander, and very yellow.

Direct intimation of this discovery was given by Prof. Schmidt to M. Leverrier, and the Paris *Bulletin International* of December 6 contains the few particulars concerning this star which the generally unfavourable weather up to that date had permitted to be put upon record. M. Paul Henry estimated it of the fifth magnitude, so that as in the cases of the similar suddenly-visible stars of 1848 and 1866, it would appear to have remained but a very short time at a maximum. He considered the colour "greenish, almost blue" by comparison with Lalande 42,304, not far distant. M. Cornu examined it on December 2 with a spectroscope applied to the great equatorial, though only during a short break; the spectrum was chiefly formed of bright lines, and consequently proceeded probably from a vapour or incandescent gas. On the same evening, but under conditions equally unfavourable, M. Cazin made similar observations with a spectroscope on the 9-inch Foucault equatorial, and with the

same result. On December 5 M. Cornu succeeded in making several measures, though still much interrupted by clouds; the *Bulletin* states:—"Il a constaté la presence des trois lignes de l'hydrogène, C, F et $\lambda = 434$ (échelle des longueurs d'onde); la raie D, du sodium, la raie b du magnésium et deux autres $\lambda = 535$ et $\lambda = 503$. La première parait coïncider avec la raie 1474 (échelle de Kirchhoff) ou $\lambda = 532$ observée pendant les éclipses dans la couronne solaire; ce qui ferait peut-être penser que la raie notée comme correspondant au sodium pourrait être celle de l'élément solaire appelé hélium."

There is a slight confusion about the declination of this star, which, according to the lithographed *Bulletin*, M. Paul Henry made three minutes less than Prof. Schmidt, while the declination, as reduced by the latter to 1855·0, differs more than a minute from his declination for 1876·0, correctly carried back.

The nearest catalogue star is one 9·2 m. = + 42°, No. 4,184, in the sixth volume of the Bonn Observations, $\Delta\alpha = - 24{\cdot}6$s., $\Delta\delta = + 4' 3''$, according to Prof. Schmidt's place. We find no star in the position of the new one, in the *Durchmusterung*, nor in Lalande, d'Agelet, Bode, Bessel, &c., nor Harding's Atlas.

The remarkable star of 1866 (T Coronæ Borealis) descended to the limit of unaided vision in ten days from its discovery by Mr. J. Birmingham, of Millbrook, Tuam, on the night of May 12, when it appears to have become suddenly visible as a star of the second magnitude: it is now a little over the eleventh magnitude in Bessel's scale extended.

The similar object of 1848, detected by Mr. Hind on the morning of April 28, then of the sixth magnitude, and certainly less than the ninth on April 4 and 5, attained its maximum about May 7, and at that time was a little brighter than 20 Ophiuchi, rated a fifth magnitude by Argelander. The maximum brilliancy assigned to this star in Schönfeld's last catalogue is one magnitude too low. It continued visible without the telescope to the end of May. Last summer it was not over the thirteenth magnitude.

[By observations at Mr. Bishop's observatory, Twickenham, on the 12th inst., the position of the new star for 1876·0 is in R.A. 21h. 36m. 50·35s. N.P.D. 47° 43′ 4″; Prof. Schmidt's declination is in error. The star was of the seventh magnitude and colourless; the sky, however, very indifferent.]

THE OPPOSITION OF MARS, 1877.—In addition to the stars observed by Bessel, which are mapped on the Astronomer-Royal's Chart in the *Monthly Notices* of the Royal Astronomical Society, the following lie near the path of the planet at this opposition:—

1. An uncatalogued star of the ninth magnitude, the place of which for 1877·0 is in R.A. 23h. 19m. 55·3s., N.P.D. 101° 21′ 49″; the planet in conjunction with this star, August 25·292, G.M.T. 5′ 14″ north.

2. Lalande, 45504 – $7\frac{1}{2}$ mag.; mean place, 1877·0, in R.A. 23h. 8m. 56·1s., N.P.D. 102° 14′ 0″; the planet in conjunction with this star, September 5·224, 3′ 10″ north.

On September 6·415 Mars will be in conjunction with, and 2′ 15″, north of a tenth magnitude, the mean place of which is in R.A. 23h. 7m. 46·4s., N.P.D. 102° 18′ 6″.

There is every reason to expect that this favourable opposition of Mars will be very completely observed with the view to another determination of the solar parallax.

NOTES

FOR the erection of a monument to Linnæus 36,000 crowns have been received. The monument will be erected in Stockholm, and will be unveiled on January 10, 1878, the hundredth anniversary of the death of the great naturalist.

THE inauguration of the Liebig monument in the new promenade at Darmstadt, will shortly take place. Pupils, friends, and admirers of Liebig are invited to be present on the occasion.

M. DE LESSEPS presented to the Academy of Sciences at its last sitting, the final report of Capt. Roudaire, who has returned from Tunis after having completed his survey of the Algero-Tunisian depression. The project is now quite complete and ready for execution. All the trigonometrical measurements have been taken, and the preliminary steps for making an inland sea have been considered. A commission, of which M. de Lesseps is a member, and will most probably be the referee, was appointed by the President, Admiral Paris. The opposition offered by some influential members of the Academy is now considered as being quite at an end.

FROM the *Tour du Monde* we learn that an American company proposes to introduce fur seals from Alaska into Lake Superior. The temperature of the lake is considered to be sufficiently cold for the purpose, and the company hopes to obtain from Congress and the Canadian Parliament an Act protecting the creatures from slaughter for twenty years, after which time it is supposed that they will be sufficiently acclimatised and numerous to form subjects of sport.

NEWS has been received from Gen. Nansauty, the adventurous observer who has located himself near the top of the Pic du Midi for the purpose of taking meteorological observations during the winter. He and his companions have been made comfortable and secure, the only thing wanting being a telegraph to connect the Pic du Midi with Toulouse as Puy-de-Dôme has been with Clermont. This will very likely be the work of next year. Up to the end of last week the weather was very mild and almost no snow had been observed.

AT the Arctic meeting of the Geographical Society on Tuesday night, honoured by the presence of the Prince of Wales, Sir George Nares and the other officers of the Expedition met with a deservedly enthusiastic reception. Addresses were given by Sir George Nares and Captains Stephenson and Markham, in which details were given of the work of the Expedition. Sir G. Nares gave a clear account of the currents of the Atlantic and Pacific in their bearing on the condition of the ice in the Arctic regions. We may now consider the Polar basin, he stated, as a locked-up bay continuing out of the narrowed North Atlantic Channel, with a warm stream of water constantly pouring into it between Spitzbergen and Norway, and a cold icy one as constantly running out between Spitzbergen and Greenland, and also through the very narrow straits between Greenland and America; the first conveying an enormous source of heat towards the north, the latter causing the intense cold of Canada and that on the east coast of Greenland and North America. In the Polar Sea, near the inflow of the warm water, we should naturally expect to meet the lightest ice and an early season; near the outlets the heaviest ice. And such is found to be the case. Heavy ice has been traced all the way from Behring Straits eastward to Bank's Land, and from there, west of Prince Patrick Island, to Ireland's Eye, from which point it is lost; for the sledging parties under Admirals Richards and Osborn, journeying along the north shores of the Parry Islands, found light ice. It is therefore concluded with certainty that some protecting land exists to the northward. From the *Alert's* winter quarters the heavy Polar ice was traced by Aldrich for one-third of the distance towards Ireland's Eye, leaving 400 miles still unknown; to the eastward, Beaumont proved that it extends for 100 miles, leaving about 500 miles still unexplored between his farthest and the farthest of the Greenland Arctic Expedition under Koldewey. We have now a distinct knowledge of the nature of the ice in the Polar Sea. Whether that sea extends to the Pole or across the Pole, we cannot, according to Sir George Nares, be absolutely certain, but by reasoning, we may safely predict that a very